

FIGURE 1

VAP-1 amino acid sequence (SEQ ID NO:1)

MAVLAVVLLLACLERA VAQTFGCSNTKINDQARKMFYDAHNDARRSMAKGLE
PNKCGLLSGGKNVYELNWDCEMEAKAQEWADGCPSSFQTFDPTWQNYATYM
GSIADPLPYASMAVNGWWSEIRTVGLTDPDNKYTNSAMFRFANMANGKASAFG
CAYALCAGKLSINCIYNKIGYMTNAIIEYKGD ACTSDAECTTYSQCKNGLCYK
APQAPVVETFTMCPSVTDQSDQARQNFLDTHNKLRTSLAKGLEADGIAAGAFAP
MAKQMPKLVKYSCTVEANARTWAKGCLYQHSTSAQRPGLGENLYMISINNMP
KIQTAEDSSKAWWSELKDFGVGSDNILTQAVFDRGVGHYTQMAWEGTTEIGCF
VENCPTFTYSVCQYGPAGNYMNQLIYTKGSPCTADADCPGTQTCSVAEALCVIP

vap-1 cDNA nucleotide sequence (SEQ ID NO:2)

ATGGCGGTATTAGCAGTGGTACTACTTCTAGCATGCCTGGAGAGAGCGGTTG
CACAGACGTTCCGGCTGCTCTAACACCAAGATCAATGACCAGGCTCGTAAGAT
GTTCTATGATGCTCACAATGATGCAAGACGAAGCATGGCTAAAGGGCTTGAG
CCAAACAAGTGCGGACTCTTATCTGGTGAAAGAATGTTTATGAATTGAATT
GGGATTGCGAGATGGAAGCAAAAGCTCAGGAATGGGCAGACGGATGTCCCA
GCTCTTTCCAGACATTTGATCCAACATGGGGGCAGAACTACGCGACGTACAT
GGGATCGATTGCTGATCCGCTTCCATACGCTTCCATGGCTGTTAATGGGTGGT
GGTCGGAAATTAGAACCGTAGGACTTACGGATCCTGATAACAAGTACACTAA
CAGTGCAATGTTCCGATTTGCTAATATGGCAAATGGTAAAGCTTCAGCTTTTG
GATGTGCATACGCGTTGTGCGCAGGAAA ACTATCCATCAATTGCATTTACAA
CAAGATAGGATACATGACCAATGCTATCATTTATGAAAAAGGAGATGCCTGT
ACCAGTGACGCTGAATGCACCACCTACTCAGACTCACAATGCAAAAACGGTC
TTTGCTATAAGGCACCTCAAGCTCCAGTCGTTGAGACTTTCACAATGTGCCCT
TCGGTCACGGACCAGTCGGATCAGGCGCGTCAAACTTCTTGGACACCCATA
ACAAATTGCGTACAAGCCTTGCCAAGGGACTTGAAGCTGATGGAATTGCCGC
TGGAGCATTTGCACCAATGGCCAAGCAAATGCCAAA ACTGGTAAAATACAGC
TGCACAGTTGAAGCAAACGCCAGAACATGGGCAAAAGGATGCCTTTACCAGC
ATTCAACAAGCGCACAGAGACCAGGACTCGGTGAAAATCTTTATATGATCAG
CATTACAACATGCCTAAAATTCAAACCGCGGAGGACTCCTCAAAGGCTTGG
TGGTCCGAGTTGAAAGACTTCGGAGTCGGTTCTGACAACATTCTGACCCAAG
CAGTTTTTTGATCGTGGCGTTGGACATTACACACAAATGGCATGGGAAGGAAC
TACTGAAATTGGATGTTTTGTGGAGAATTGTCCAACATTCACTTATTCCGTAT
GCCAATATGGTCCAGCGGGAACTACATGAACCAACTAATCTATACCAAGGG
CTCACCATGCACAGCTGACGCCGATTGCCAGGAACCCAGACATGCAGTGTC
GCTGAAGCATTATGTGTTATCCCTTAGTAAATTTTCTATGCAACTCTTGAAA
GTCATAATAAATATGCAAAAATTAAAAAAAAAAAAA

FIGURE 1, cont.

VAP-2 amino acid sequence (SEQ ID NO:3)

MNVVLSAVTLFLIFRYAQTVNIEGSGGNDELLEQNVWNDVDDKVVEALGGLDD
ELLTEHVCNKSTITQLQQEILTTHNELRRSLAFGKQRNKRGLMNGARNMYKLD
WDCELASLANWSTSCPQHFMPSVLGSNAQLFKRFYFYFDGHDSTVHMRNA
MKYWWQQGEEKGNEDQKNRFYARRNYFGWANMAKGKTYRVGCSYIMCGDG
ESALFTCLYNEKAQCEKEMIYENGKPCCEDKDCFTYPSKCLVPEGLCQAPSMV
KDDGGSFQCDNSLVSDVTRNFTLEQHNFYRSRLAKGFEWNGETNTSQPKASQM
IKMEYDCMLERFAQNWANNCVFAHSAHYERPNOGQNL YMSSFSNPDPRLIHT
AVEKWWQELEEFGTIDNVLTPELWDLKGKAIGHYTQMAWDRTYRLGCGIANC
PKMSYVVCHYGPA GNRKNNKIYEIGDPCEVDDDCPIGTDCEKTTSLCVISK

vap-2 cDNA nucleotide sequence (SEQ ID NO:4)

ATGAACGTGGTCCTTTCCGCTGTCACTCTTTTCTTATTTTTCGATATGCGCAG
ACTGTGAATATAGAAGGCAGTGGAGGAAATGATGAGCTTCTTGAGCAGAACG
TGTGGAACGATGTAGACGACAAGTTGTAGAAGCACTTGGTGGTCTTGATGA
TGAAGTCTAACC GAACATGTGTGTAACAAATCAACGATCACTCAGCTACAG
CAGGAGATCATCTTGACAACCCACAATGAATTACGAAGATCATTGGCTTTTCG
GAAAGCAAAGAAACAAGAGAGGTCTCATGAACGGTGCAGAGAAATATGTATA
AACTGGATTGGGATTGTGAACTGGCATCACTTGCAGCCAATTGGTCAACCTCC
TGCCCTCAGCACTTTATGCCGCAATCGGTACTTGGCTCCAACGCTCAGCTTTT
TAAGCGTTTCTATTTTATTTTGTATGGGCACGACTCTACTGTACATATGCGAA
ACGCGATGAAGTATTGGTGGCAGCAAGGTGAAGAAAAAGGCAATGAGGATC
AGAAAAATAGATTCTATGCCAGACGAAATTATTTTGGATGGGCAAACATGGC
AAAAGGAAAAACATATCGAGTTGGATGCTCGTATATTATGTGCGGCGACGGT
GAATCTGCACTTTTCACTTGTCTTTATAACGAAAAAGCCCAATGCGAAAAAG
AAATGATTTACGAAAATGGAAAACCCTGCTGTGAGGATAAAGACTGTTTCAC
ATATCCAGGATCAAAATGTTTAGTACCTGAAGGATTATGTCAAGCACCTTCTA
TGGTAAAGGATGATGGAGGAAGTTTCCAATGTGATAACTCCCTTGTGTCAGA
TGTCACCCGCAATTTCACTTTGGAGCAACACAATTTTATAGATCTCGTCTTG
CAAAAGGTTTTGAATGGAATGGAGAAACAAACACTTCCCAGCCAAAGGCTAG
TCAAATGATCAAAATGGAGTATGACTGCATGTTGGAACGGTTTGCACAAAAC
TGGGCAAATAATTGCGTTTTTGCACACTCGGCACATTACGAAAGACCGAATC
AGGGTCAGAATCTCTACATGAGTTCTTTCTCAAACCCTGATCCTAGAAGCCTT
ATACATACGGCCGTCGAGAAGTGGTGGCAGGAATTGGAGGAGTTCCGTACTC
CAATTGATAACGTTCTGACACCCGAATTGTGGGATTTGAAAGGGAAAGCGAT
AGGACATTACACTCAGATGGCCTGGGATCGTACTTACCGTCTTGGTTGTGGAA
TCGCAAACGTGCCGAAGATGTCGTACGTGGTTTGTCACTATGGGCCAGCAGG
CAACAGAAAGAACATAAAATCTATGAAATCGGGGATCCTTGCGAAGTCGAT
GATGATTGCCCGATTGGAACAGATTGTGAAAAGACAACCTTCTTTATGTGTGAT
CTCAAATAA

3355027_1.DOC

FIGURE 2: Schematic diagram of nematode venom allergen protein domains

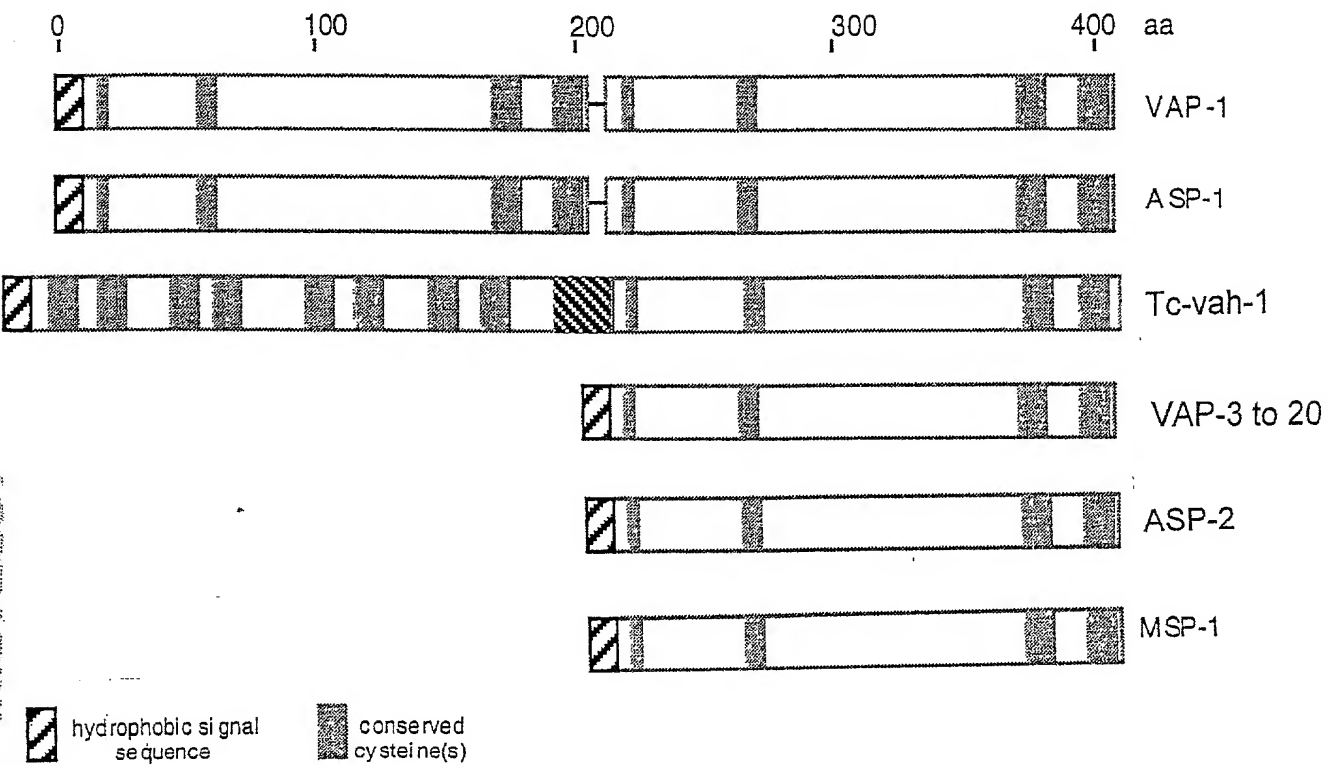


FIGURE 3

CLUSTAL W Alignment of VAP-1, VAP-2, and selected other nematode VA proteins.

```

VAP-1 N 1  . . . . . MAVLAVVLLLA CLERA V AQTTFG 22
VAP-1 C 1  . . . . . P QAPV V ETFTM 11
VAP-2 N 1  MNVVLSAVTLFLIFRYAQT VNI EGSGGND E LLEQNVWNDVDDKVVBALGGLDDE L L TEHV 60
VAP-2 C 1  . . . . . S FQ 3
ASP-1 N 1  . . . . . M FSPVIVSVIFTIA FCDAS PARDGFG 26
ASP-1 C 1  . . . . . D V P ETNQQ 8
VAP-3 1  . . . . . MNYLLLV A LA VG 13
MSP-1 1  . . . . . MSNKLIIS L LILT I 14

VAP-1 N 23  C SNTKIN - - DQARKMFYDAHNDARRSMAKGLEPN - - KCGLLSGGKNY YELN - WDC EMEA 76
VAP-1 C 12  C P S V T - D Q S D Q A R Q N F L D T H N K L R T S L A K G L E A D G I A A G A F A P M A K Q M P K L V K Y S C T V E A 70
VAP-2 N 61  C N K S T - - I T Q L Q Q E I I L T T H N E L R S L A F G K Q R N - - K R G L M N G A R N M Y K L D - W D C E L A S 114
VAP-2 C 4  C D N S L V - - S D V T R N F T L E Q H N F Y R S R L A K G F E W N G - E T N T S Q P K A S Q M I K M E - Y D C M L E R 59
ASP-1 N 27  C S N S G - - I T D K D R Q A F L D F H N N A R R R Y A K G V E D S - - N S G K L N P A K N M Y K L S - W D C A M E Q 80
ASP-1 C 9  C P S N T - G M T D S V R D T F L S V H N E F R S S Y A R G L E P D - - A L G Q N A P K A A K M L K M V - Y D C E V E A 64
VAP-3 14  C S A D F G - - S S G Q N G I L N A H N T L R S K I A S G T Y V A - - K G T Q K S P G T N D L K M K - W D S A V A A 66
MSP-1 15  I Y T V V N S L T V P E Q N A V V D C I N K Y R S Q L A N G K T K N - - K N G G N F P S G N D L E V S - Y S K D L E K 71

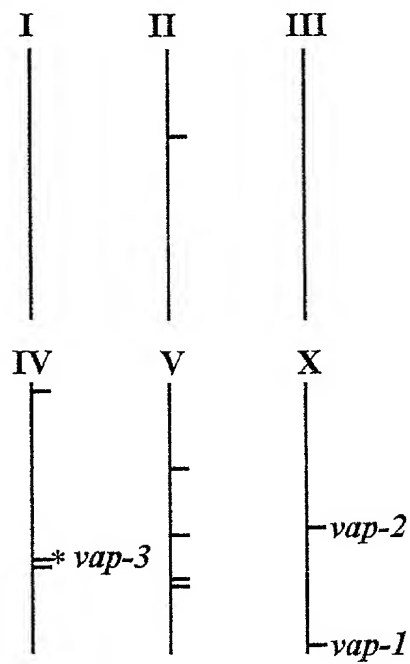
VAP-1 N 77  K A Q E W A D G O P S S F Q T - - F D P T - - W G Q N Y A T Y M G S I - - A D P L P Y A S M A V N G W W S E I R T V G 129
VAP-1 C 71  N A K T W A K G C L Y Q H S T S A Q R P G - - L G E N L Y M I S I N N - - M P K I Q T A E D S S K A W W S E L K D F G 125
VAP-2 N 115  L A A N W S T S C P Q H F M P Q S V L G S - - N A Q L F K R F Y F Y F D G H D S T V H M R N A M K Y W W Q Q G E E K G 171
VAP-2 C 60  F A Q N W A N N C V F A H S A H Y E R P N - - Q G Q N L Y M S S F S N - - P D P R S L I H T A V E K W W Q E L E H F G 114
ASP-1 N 81  Q L Q D A I Q S C P S A F A G - - I Q G - - V A Q N V M S W S S S G G F P D P S V K I E Q T L S G W W S G A K K N G 134
ASP-1 C 65  S A I R H G N K C V Y Q H S H G E D R P G - - L G E N I Y K T S V L K - - F D K N K A A K Q A S Q L W N E L K E F F G 119
VAP-3 67  S A Q N Y A N G C P T G H S G - - D A G - - L G E N L Y W Y W T S G S L G D L N Q Y G S A A S A S W E K E F Q D Y G 120
MSP-1 72  S A Q R W A N K I C I F D H N G T D L Y S G K F Y G E N L Y L D G D F E H - K N I T Q L M I D A C N A W G E S T T D G 130

VAP-1 N 130  L T D - - - - P D N K - - Y T N S A - - M F R P A N M A N G K A S A F G C A Y A L C A G K L - - - - S I N G I 172
VAP-1 C 126  Y G S D - - - - N I L T Q A - - V F D R G - - V G H Y T O M A W E G T T E I G C F Y E N C P T F T - - - - Y S V C Q 171
VAP-2 N 172  N E D Q - - - - K N R - - F Y A R R N - - Y F G W A N M A K G K T Y R Y G G S Y I M C G D G E S - - - - A L F T C L 217
VAP-2 C 115  T P I D - - - - N V L T P E - - L W D L K G K A T G H Y T O M A W D R T Y R L G G T A N C P K M S - - - - Y Y V C H 163
ASP-1 N 135  V G P D - - - - N - - - - K Y N G G G - - L F A F S N M V Y S E T T K L G C A Y K V C G T K L - - - - A Y S C I 176
ASP-1 C 120  V G P S - - - - N V L T T A - - L W N R P G M Q T G H Y T O M A W D T T Y K L G C A V V F C N D F T - - - - F G V C Q 168
VAP-3 121  W K S - - - - N L M T I D - - L F N T G - - I G H A T O M A W A K S N L I G C G Y K D C G R D S N G L N K V T T V C Q 171
MSP-1 131  V P P S W I N N F L P T D N K E N D E K F E A V G H W T O M A W A K T Y O L G C A T K V C H K P D C N G N - - L F D C R 188

VAP-1 N 173  Y N K I G Y M T N A I P Y R K G D A C T S D A E C T T Y S - - D S Q C K N G L C Y K A - - - - - 213
VAP-1 C 172  Y G P A Q N Y M N Q L I Y T K G S P C T A D A D C P G T Q - - T C S V A E A I C - V - - I P - - - - 212
VAP-2 N 218  Y N E K A Q C E K E M I Y E N G K P C C E D K D C F T Y P G S K C L V P E G L C Q A P S M V K D D G G 268
VAP-2 C 164  Y G P A G N R K N N K I Y E I G D P C E V D D D C P I G T - - D C E K T T S L C - V - - I S K - - - - 205
ASP-1 N 177  Y N G V G Y I T N Q P M W E T G Q A C K T G A D C S T Y K - - N S G C E D G L C T K G P - - - - - 218
ASP-1 C 169  Y G P G G N Y M G H V I Y T M Q Q P C S - - Q C S P G A - - T C S V T E G L C - S - - A - - P - - 206
VAP-3 172  Y K P Q G N F I N Q Y I Y V S G A T C S - - G C P S G T - - S C E T S T G L C V - - - - - 207
MSP-1 189  Y Y E G C N G M G S P I Y Q Q G K P A S - - G C G K A G - - P S T K Y S G L C K P D P H Q N N - - - 231

```

FIGURE 4: Schematic map of selected *C. elegans* *vap* genes



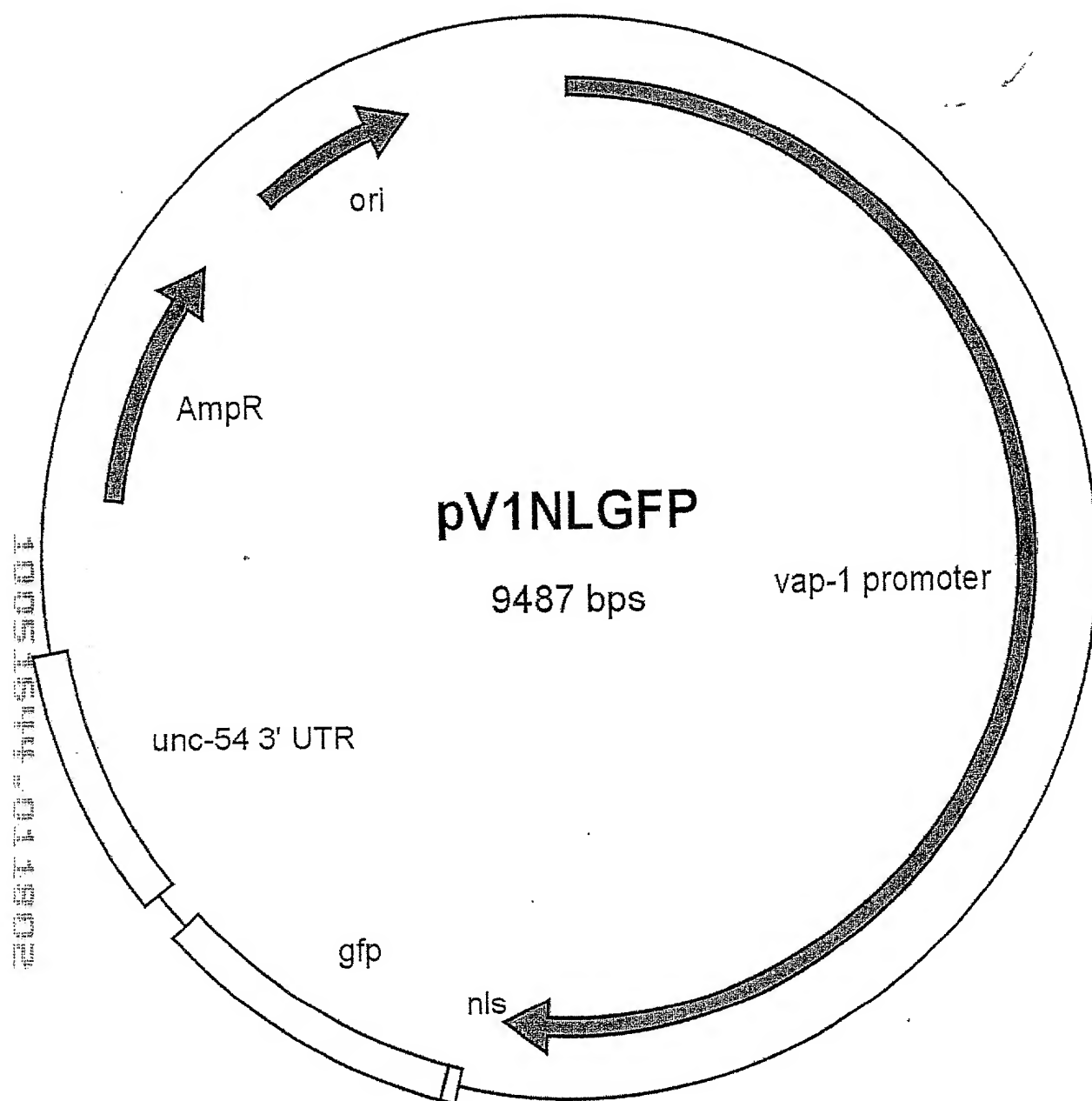


FIGURE 5A

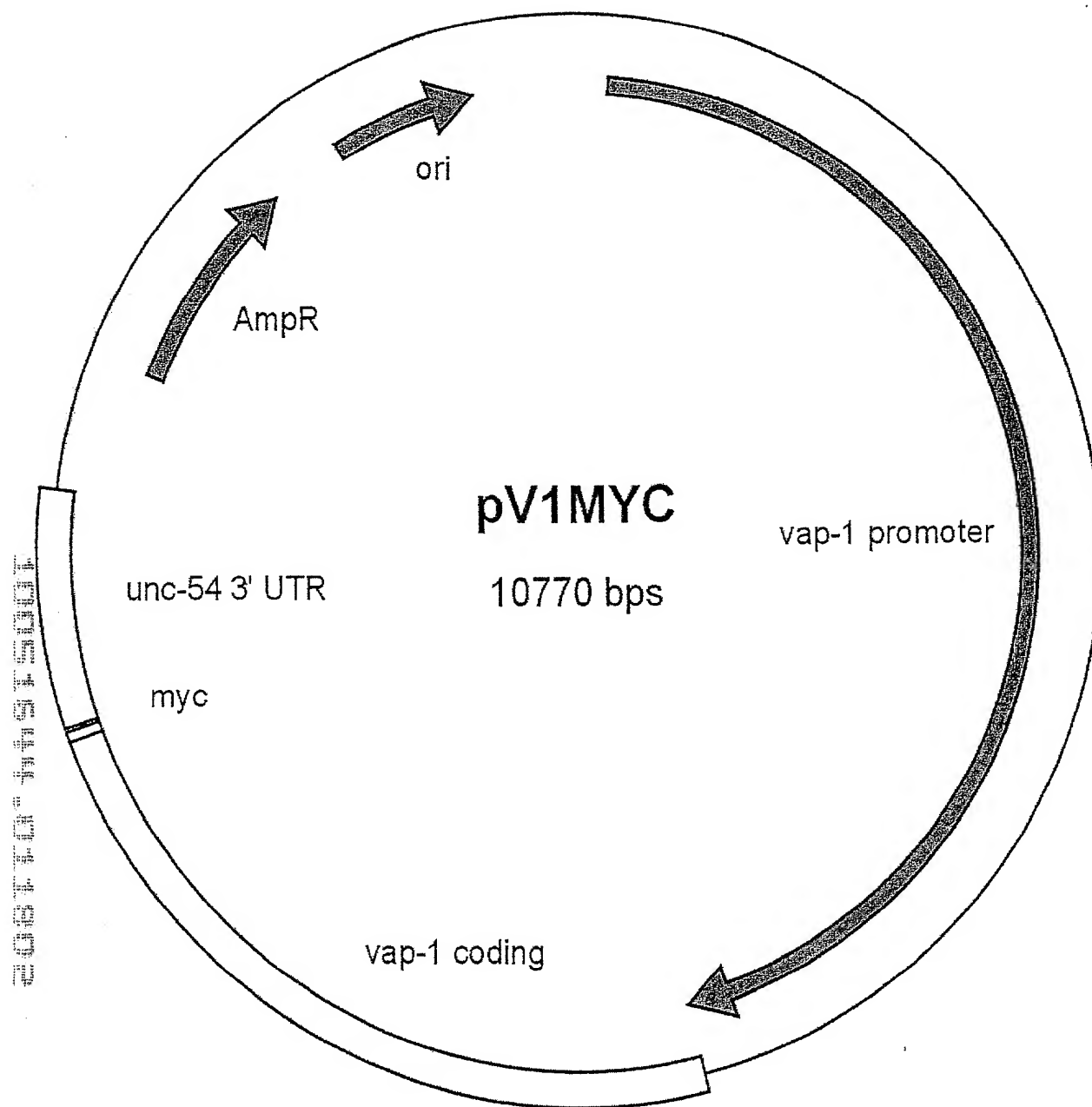


FIGURE 5B

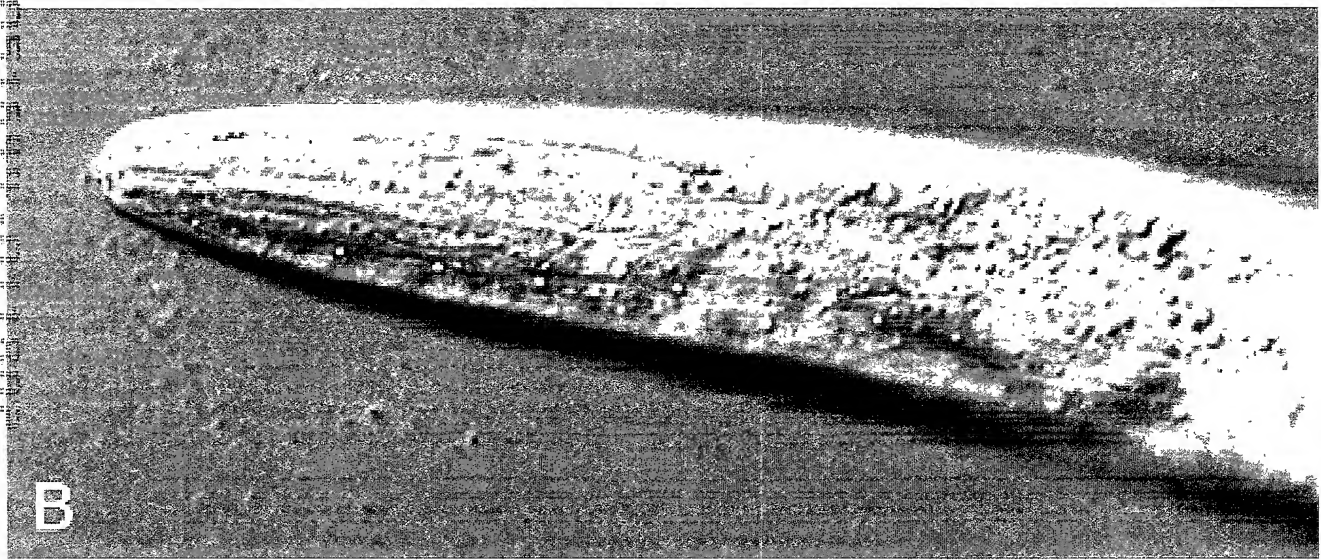


FIGURE 6

FIGURE 7

1

2

3

97 —
66 —
45 —
30 —

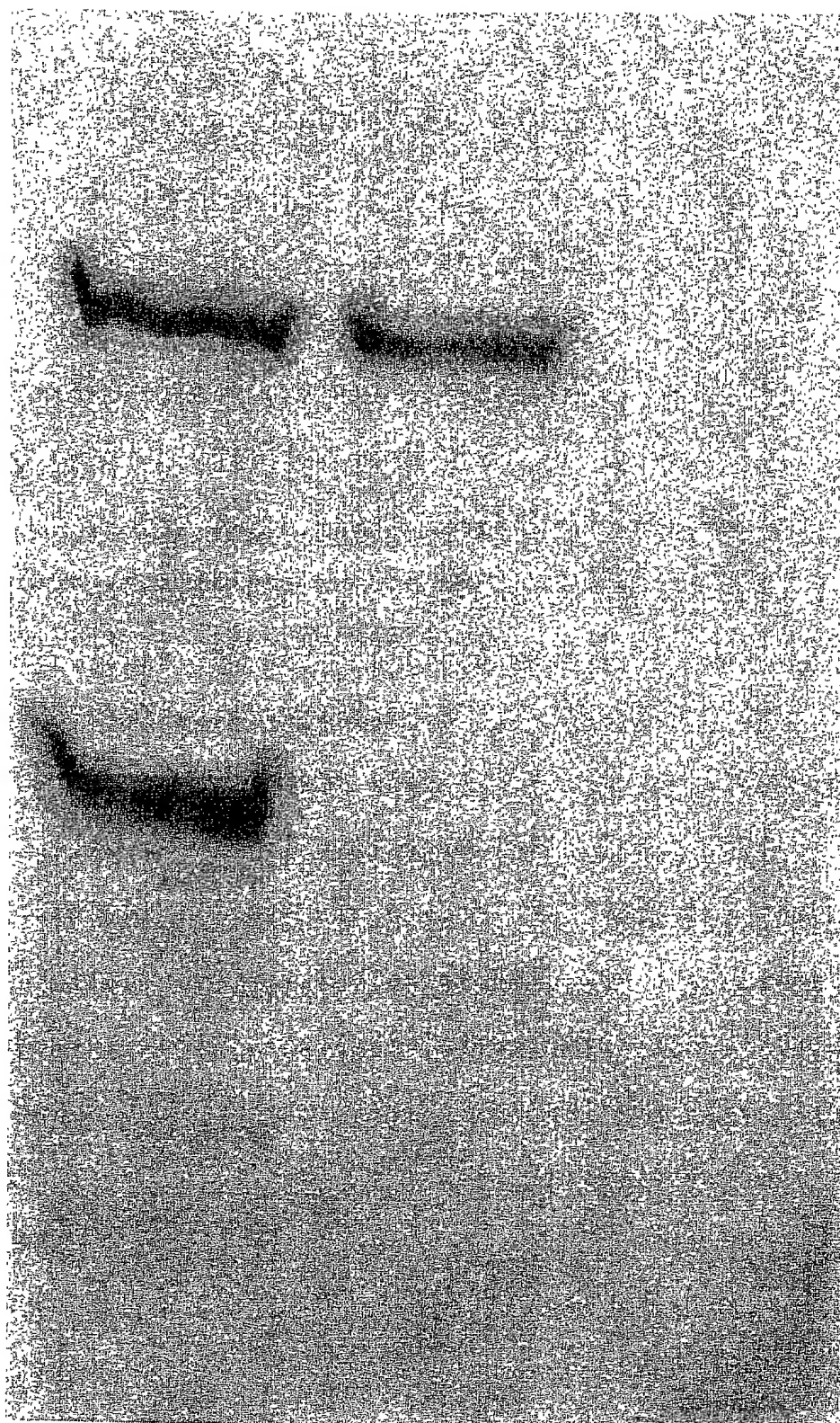
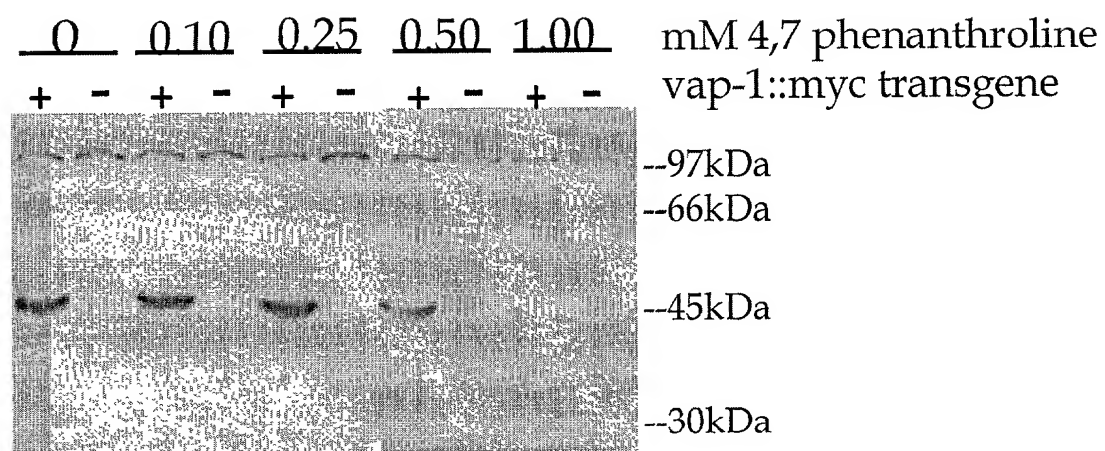


FIGURE 8



bioRxiv preprint doi: <https://doi.org/10.1101/000000>; this version posted January 1, 2014. The copyright holder for this preprint (which was not certified by peer review) is the author/funder, who has granted bioRxiv a license to display the preprint in perpetuity. It is made available under aCC-BY-NC-ND 4.0 International license.